

Claim Rejections-35 U.S.C. 112

Claim 26 was rejected under 35 U.S.C. 112(1). Applicants respectfully traverse the rejection.

The Office had asserted that the specification does not support "a chamber pressure of less than 0.01 Pa." However, this limitation appears in claim 27, not 26, and is clearly supported by the third-from-last sentence of paragraph 0053. As noted in the Interview Summary, this rejection has been withdrawn

Claim Rejections-35 U.S.C. 102

Claims 1-5, 7, 10-16, 19, 21, 22, and 26 were rejected as being anticipated by Bergmann et al. (US4992153). Applicants respectfully traverse the rejection.

Bergmann et al. identifies a "sputter-CVD process" and distinguishes this from a PVD process. Col. 1, lines 36-39. An evaporation crucible 9 contains titanium 17. The oddly-worded first paragraph of page 3 asserted that the evaporation crucible itself was the one or more first components. The meaning is unclear and insufficiently articulated. As is discussed further below, it appears to make sense to apply the titanium against the present first components of claim 1. Electron beam 30 is "guided onto the material 17 to be evaporated." Col. 3, lines 21-23. A tungsten carbide sputter target 31 acts "as cathode, which is atomized during sputtering." Col. 3, lines 35&36. Codeposition appears to occur in the middle of three stages: first a titanium layer; then the codeposited mixed layer; and finally a tungsten carbide/carbon layer.

Claim 1 had been amended to identify that ions of the first components are used to sputter the second components. Similar amendments had been made to the other independent claims. Bergmann et al. does not suggest this. Rather, sputtering is via ions of gas introduced to the chamber. As is discussed further below, this distinction highlights several other dependent claim elements.

Claims 1 and 19 have been amended to incorporate claim 27 which identifies a chamber pressure less than 0.01Pa. This distinguishes the conditions of that deposition from those of the Bergmann et al. deposition which occurs via one or more external gas flows.

The Office asserted:

It is inherent that some of the evaporated titanium ions will be absorbed into the plasma from gas inlet [10]. The plasma, and therefore titanium ions, is then used

to sputter from the target [31]. Thus ions from the crucible (first component) [9] are used to sputter the target (second component [31]).

Office action, page 3, line 7-11.

The Office has not quantified whatever vanishingly small amount of titanium is asserted as involved. The Office, at best, asserts a negligible or vanishingly small contribution by titanium.

Even if there is such a contribution by titanium, the incidental migration of an apparently trivial and non-effective amount of titanium to the sputter target would not be anticipatory. *See, e.g., In re Ratigan*, 64 USPQ 567, 568-9 (C.C.P.A. 1945) (“[A]ccidental seepage” did not “furnish interconnection between the conduit and the oil passage in general around the packing.”). *See, also, Ex parte Hartmann*, 186 USPQ 366, 367 (Bd. Pat. App. & Int. 1974) (“We believe that the routineer would construe ‘partial drawing’ to mean an intentional, positive act over and above any incidental elongation arising out of normal handling of the filaments.”).

The Response to Argument section does not clear this up. The odd wording of the rejection is repeated in the assertion that “the evaporation crucible is a first component” Office action, page 16, lines 3&4. As is understood by Applicants, the crucible itself does not evaporate, merely its contents do to provide what appears to be cited as the claimed first component. The asserted negligible participation of titanium is discussed above.

Regarding claim 3, the citation is a total vitiation of the reference to encircling. The Office action merely asserted:

it is expected that part of said material (i.e. an ion flowpath) will cross into the sputter ion path by diffusion principles. Thus, the sputtering target encircles an ion flowpath from the evaporation crucible.

Office action, page 3. This is a clear vitiation of the encircling element. It is unreasonable, and contrary to how the element would be interpreted by one of ordinary skill in the art. Effectively, this unreasonable interpretation indicates that any even remote positioning is not merely along the flowpath but encircling it. The proximity to the flowpath is, as noted above, relevant to the use of the ions of the first material to sputter the second material. As noted in the Interview Summary above, claim 3 has been re-presented in independent form as new claim 28 and also incorporated into independent claim 14 with amendment to claim 18 for antecedence.

Regarding claim 7, it was asserted that:

It is known that prior to adhering a layer onto a workpiece, to clean/polish/etch in order to provide a superior surface for the deposited layer to adhere too [*sic*]. During this cleaning/polishing/etching, workpiece material will inherently be removed.

Office action, page 4, lines 5-8. This is a clear vitiation of the claim 7 identification of restoration. No basis has been cited in Bergmann et al. for a restoration effect.

Regarding claims 10 and 26, the Office action engages in pure bootstrapping asserting that because Bergmann et al. references titanium as a coating component and titanium is used turbine engine parts, Bergmann et al. discloses depositing on Ti alloy turbine engine parts. By identifying “sliding quality” it appears Bergmann et al. would involve some bearing. Abstract. This has not been established as the claimed Ti alloy turbine parts. The identification of titanium as a coating component for a bearing does not suggest use as a Ti-alloy turbine engine part. The Response to Argument section does not further clarify this. The “intended use” assertion is misdirected in several regards. First, it ignores the relationship between the titanium substrate and titanium coating, regardless of turbine engine use. Second, it has not been adequately supported (e.g., the doctrine has typically been applied to apparatus claim preamble limitations not repeated in the claim body). How it applies to the present case has not been demonstrated.

Regarding claim 11, there has been no application of 35 U.S.C. 112(6) as is required by *In re Donaldson*. For example, there has been no comparison of the structure of Bergmann et al. to the structure disclosed in the present application for the various 112(6) elements. Bergmann et al. clearly involves different structure and not equivalent structure.

There is no support for the assertions relative to claim 12 which, nevertheless, do not cure the deficiency of the underlying rejection of claim 11 including the failure to apply 112(6). Similar considerations attend claim 13.

Regarding amended claim 14, the rejection is overcome for the reasons noted above.

Regarding claim 15, no support has been cited for the presence of aluminum or vanadium at all, let alone in the claimed combination. The Response to Argument section only further confuses this. New arguments are asserted regarding col. 6, lines 15-21 which, on its face is non-specific and non-enabling. The particular passage lists a lengthy list of materials:

Instead of tungsten (tungsten/tungsten carbide) as the material to be sputtered, also boron, carbon, silicon, metals of the chemical groups IVb, Vb, VIb, VIII, or their alloys with a substantial proportion of these elements, or compounds of these elements with one another or metalloids of the groups IVa, Va, VIa can be

used as the cathode material.

The Office, however, also ignores the subsequent limitations on those materials that:

The layers produced by the above process possess 50 to 99 atom percent free carbon and a balance containing essentially carbides of the elements boron, silicon or of the elements of the groups IVb, Vb, VIII or their mixtures.

Bergmann et al., col. 6, lines 22-26.

Thus, the asserted coatings are limited to predominantly carbon layers, not Ti alloys.

Regarding claim 16, the assertions, even if correct, do not cure the deficiencies of the underlying rejection of claim 14.

Regarding amended claim 19, the rejection is overcome for the reasons noted above.

Regarding claims 21 and 22, the assertions at the first full paragraph of claim 8 are clearly insufficient and apparently unreasonable. These relate to the flowpath issues discussed above. For example, the prior Office action did not actually identify (e.g., via a drawing mark-up) the flowpath and the respective upstream direction and downstream direction. The apparent reference to the bottom face of the target has not been established as facing upstream and away from the flowpath. The Response to Argument section does not clarify this. The marked-up drawing at page 17 clearly vitiates the term “upstream” as the asserted second surface does not in any way relate to a flow. It effectively appears to form a part of the outer wall of the chamber. Thus, the apparent claim interpretation is clearly unreasonable.

Claims 1 and 27 were rejected as being anticipated by Zabinski et al. (USH001933). Applicants respectfully traverse the rejection.

Zabinski et al. discloses a system having a sputtering source 21. Zabinski et al. also includes a target 28 ablated by a laser beam. Long overlapping lists of materials are respectively identified for the source 21 and target 28. Col. 3, line 57, *et seq.* identifies a simultaneous deposition mode. The citation of Zabinski et al. suffers the same deficiency noted above relative to Bergmann et al. Nothing more than negligible participation of titanium in the sputtering is alleged. Additionally, the cited col. 2, lines 38-41 pressures are only initial evacuation pressures. The remainder of that sentence identifies that “an inert gas is introduced as at inlet 18 to a pressure of about  $10^{-3}$  torr and power is applied to magnetron source 21 to start sputtering.”

Thus, clearly sputtering occurs at pressures well above those claimed, as discussed above in the Interview Summary.

Claim Rejections-35 U.S.C. 103

Claim 6 was rejected under 35 U.S.C. 103(a) as being unpatentable over Zabinski et al. and further in view of Lederich et al. (US4415375). Applicants respectfully traverse the rejection.

Lederich et al. merely discloses various titanium alloys. A first alloy is formed by conventional means. The composition is then altered "by heating the base titanium or titanium alloy under pressure in a non-flammable atmosphere containing hydrogen" to add hydrogen to the composition. "The alloys containing hydrogen may be formed [(i.e., re-shaped)] by superplastic forming techniques." Then, the hydrogen is removed to restore the composition. Disks were referenced apparently as being test specimens for this process. There is no suggestion to use the disk as a target. In the third and fourth paragraphs of page 9, the Office action engages in an improper bootstrapping. The first and second full paragraphs of page 10 referenced the Ti-8Al-1Mo-1V alloy and asserted:

...Lederich et al cites the advantage of this alloy as parts and structures formed and restored from said alloy retain the strength and structural integrity of the base alloy.

It would have been obvious to one of ordinary skill in the art to use form a transient titanium alloy of Lederich et al from the deposition materials in Zabinski et al to gain the advantages of retention of base alloy strength and structural integrity.

Common sense indicates the opposite. An advantage of the basic alloy asserted by Lederich et al. cannot constitute a specific suggestion to use a newly hypothesized manufacturing technique for such material over conventional known techniques. Furthermore, Lederich et al.'s advantages clearly relate to formation of a substrate rather than formation of a coating. This does not suggest what composition the coating of Zabinski et al. should have, let alone exactly how it be prepared.

Nevertheless, in view of the foregoing amendment, the rejection is believed moot.

Claim 8 was rejected under 35 U.S.C. 103(a) as being unpatentable over Bergmann et al.

and further in view of Ray et al. (US6986381). Applicants respectfully traverse the rejection.

Ray et al. involves the fabrication of molds for titanium castings. At the paragraph spanning pages 10 and 11, the Office action asserted a yield strength of Ray et al. materials as being a bond strength. This is pure bootstrapping. There is no bond between a substrate and coating asserted. The Office action then asserted that it would have been obvious "to apply the refractory metal alloy properties taught in Ray et al for Bergmann et al to gain the advantages of a superior hard and wear resistant coating." Office action, page 11, first full paragraph. First, the nature of the combination has not been sufficiently specifically articulated. For example, exactly what is being replaced in Bergmann et al. and why? What is being preserved in Bergmann et al. (e.g., is the substrate being preserved?). The Office action has not even articulated what the substrate of Bergmann et al. is and why it has a coating. How does one "apply... properties"? Without such an identification, how can one identify an expectation of success, the absence of defeating any other advantages/properties of Bergmann et al., etc.?

The second full paragraph of page 10 in citing *In re Wertheim* is unexplained. What ranges are asserted as overlapping? It appears that there has merely been a hindsight reconstruction via keyword search regarding a stress/pressure magnitude. Even worse, the reconstruction is merely a reconstruction of words rather than articulating how an actual product or process would be implemented with an expectation of success, etc.

Nevertheless, in view of the foregoing amendment, the rejection is believed moot.

Claim 9 was rejected under 35 U.S.C. 103(a) as being unpatentable over Bergmann et al. and Ray et al. and further in view of Gabriele et al. (US6875318) Applicants respectfully traverse the rejection.

Gabriele et al. appears to involve polymer coating of stainless steel. Where is the relevance? What is the nature of the combination (e.g., what elements are taken from Gabriele et al., how are they incorporated, what other changes are made)? Where is the expectation of success?

The assertion in the first full paragraph of page 12 of analogy between the references is misdirected. As noted above, clearly different coatings are involved for different purposes. Merely because both references have extensive lists of possible coating components that might overlap does not establish analogy. The citation to *In re Bozek* is unclear. Although a citation

may be unnecessary for a common sense motivation, the Office is not relieved of the obligation to articulate what that motivation is (e.g., common sense in order to achieve what particular result with what expectation of success). The assertion of a user inputted variable is also unclear. The variable is inputted for particular purposes presumably associated with the respective references. Again, these have not been properly analogized to each other or to the presently-disclosed situation. The assertion of "common knowledge of a person skilled in the art", of course, begs the question of what art. Presumably if the Office is drawing on the skills of persons in different arts for different purposes different results would be achieved.

Nevertheless, in view of the foregoing amendment, the rejection is believed moot.

Claim 17 was rejected under 35 U.S.C. 103(a) as being unpatentable over Bergmann et al. and further in view of Gruen (US5015493). Applicants respectfully traverse the rejection.

Gruen was apparently cited for the bias voltages of claim 17. It was asserted as obvious to substitute the modulated voltage "of Gruen for the DC power supply of Bergmann et al to gain the advantage making it possible to coat surface structures of workpieces having slots and bores." Office action, page 13, second full paragraph. No substantiation was made that Bergmann et al. had such slots and bores and required such modification, let alone, that such modification would be selected by one of ordinary skill in the art with an expectation of success.

Nevertheless, in view of the foregoing amendment, the rejection is believed moot.

Claims 18 and 20 were rejected under 35 U.S.C. 103(a) as being unpatentable over Bergmann et al. and further in view of Nulman et al. (US6231725). Applicants respectfully traverse the rejection.

Nulman et al. involves sputtering in the fabrication of semiconductor devices. Col. 1, line 9. Nulman et al. was cited for the presence of two targets 110, 500. It was asserted as obvious to use multiple targets and bias voltages of "Nulman et al for the sputter device of Bergmann et al to gain the advantage of increased deposition uniformity." Office action, page 14, second full paragraph. This, again, is conclusory. Insufficient analogy has been demonstrated between Bergman et al. and Nulman et al. What is the nature of the combination? For example, what are the two different materials and voltages of the different targets? It has not been demonstrated

that one of ordinary skill in the Bergmann et al. art would have found a deficiency and sought Nulman et al. as the cure, let alone with an expectation of success.

Nevertheless, in view of the foregoing amendment, the rejection is believed moot.

Claim 23 was rejected under 35 U.S.C. 103(a) as being unpatentable over Bergmann et al. and further in view of Nulman et al. Applicants respectfully traverse the rejection.

This rejection suffers the same deficiencies as does the claim 18&20 rejection above and does the underlying Bergmann et al. rejection. The first full paragraph of page 15 highlights the lack of clarity and articulation. It asserts that it would have been obvious "to stack multiple compositional sputter targets taught in Nulman et al inside the sputter target sleeve in Bergmann et al to gain the advantage of increased deposition uniformity." What target sleeve? How are they stacked? At least, for example, a marked-up drawing of Bergmann et al. showing the hypothesized modification is necessary to sufficiently articulate the nature of the combination.

Nevertheless, in view of the foregoing amendment, the rejection is believed moot.

Accordingly, Applicants submit that claims 1-23 and 26 and 28 are in condition for allowance. Reconsideration and further examination are requested. Please charge any fees or deficiency or credit any overpayment to our Deposit Account of record.

Respectfully submitted,

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